

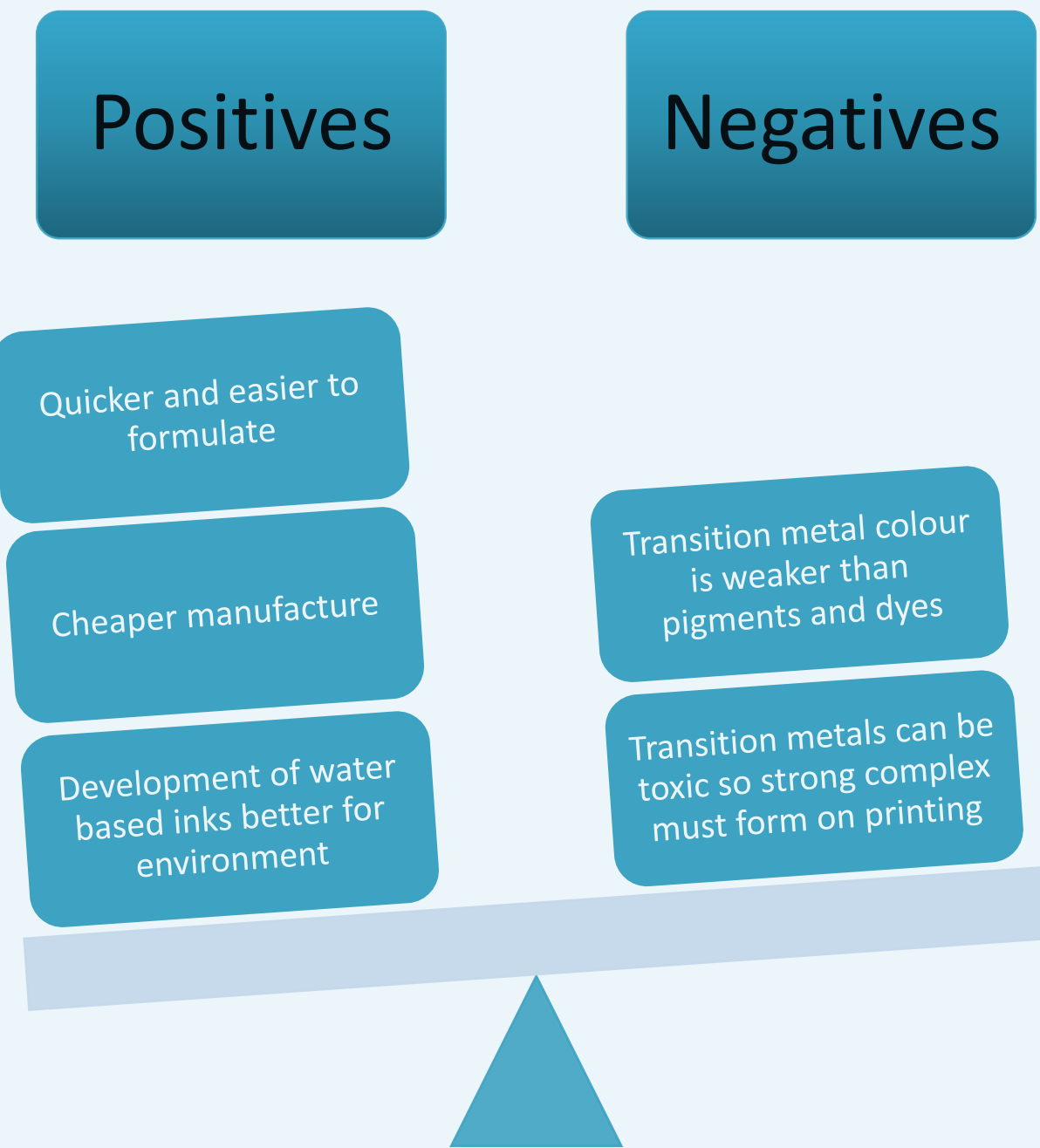
Investigating the use of transition metal-polymer complexes as colourants in inks



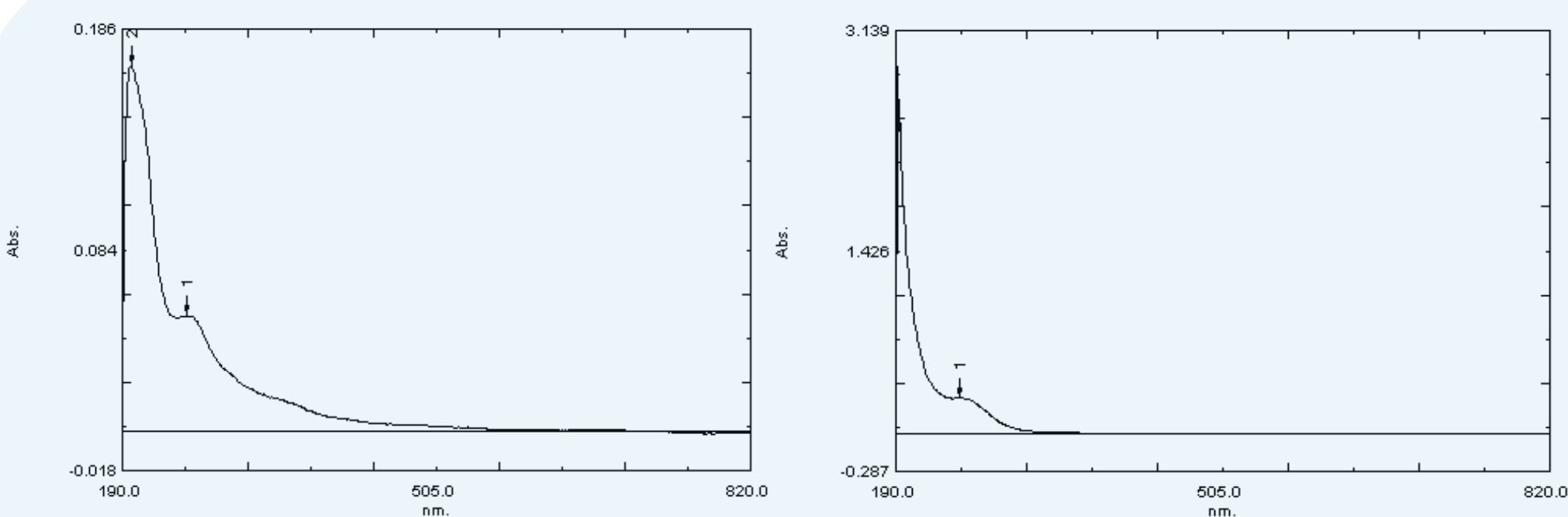
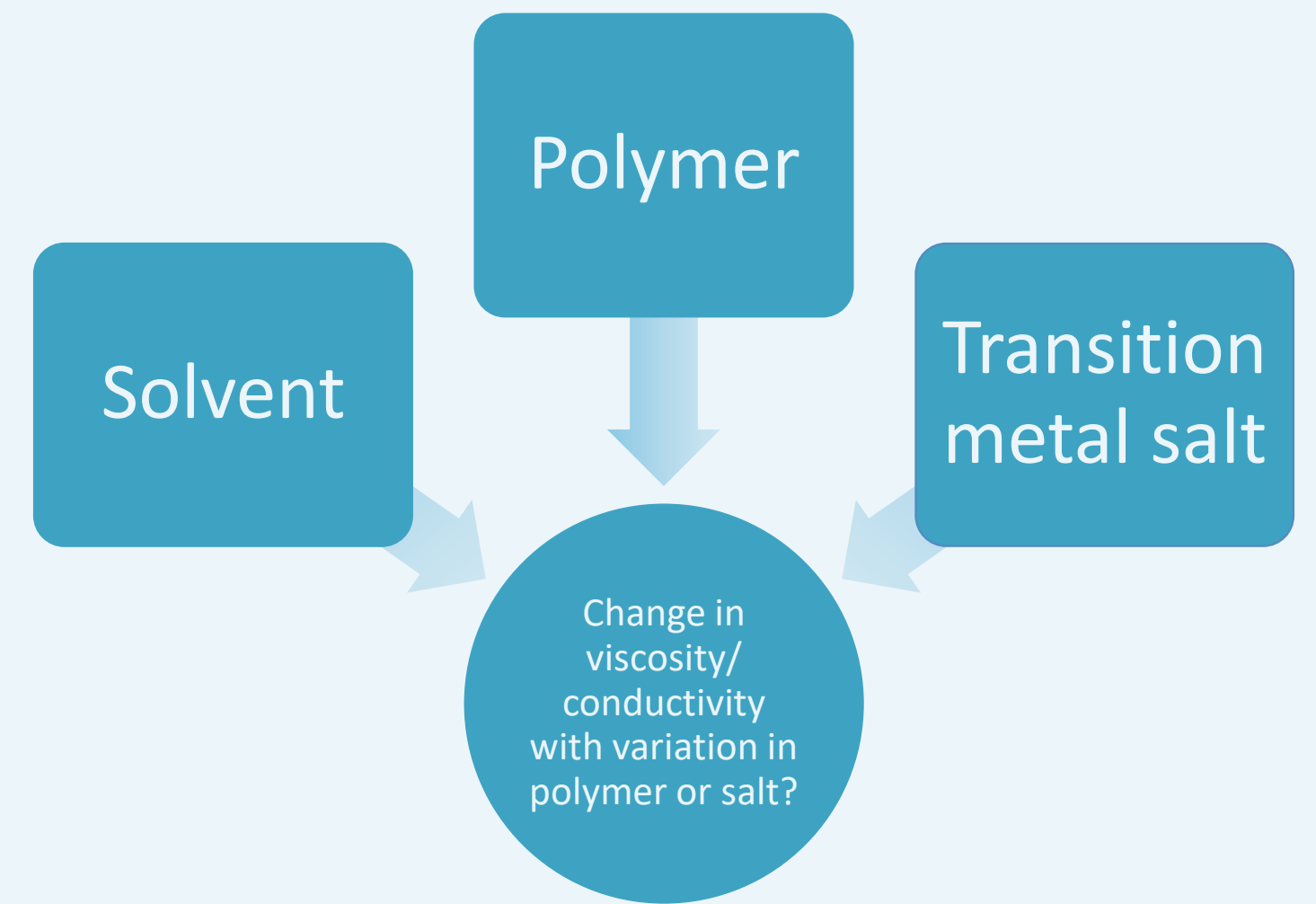
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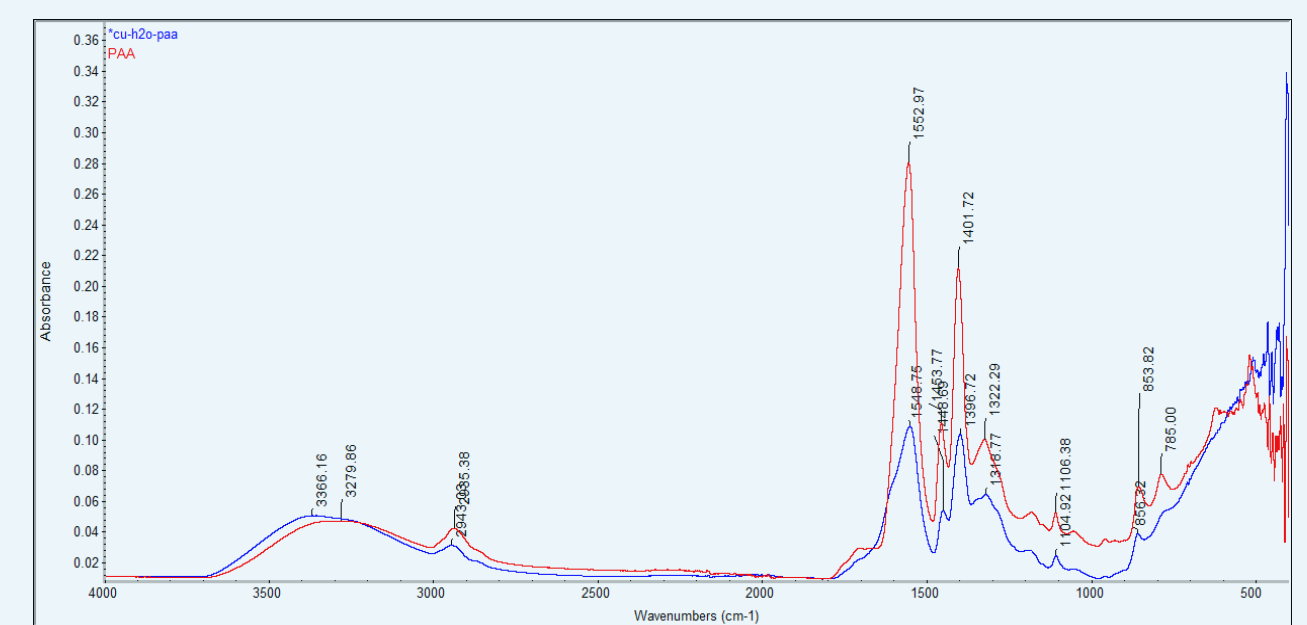
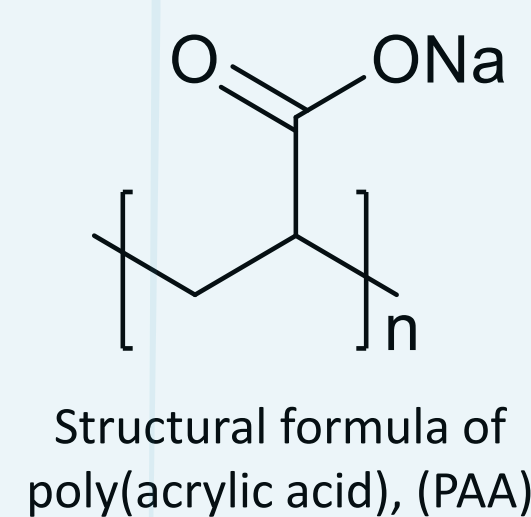
The project investigated using transition metal-polymer complexes in inks as a colourant, in place of traditional dyes and pigments. Within the complex the metal ion should be strongly bound so it would not migrate, but the complex must also be soluble for ease of printing.



To investigate which polymers formed complexes and those with the potential to be printed, a control was used without the salt and polymer individually for comparison. Any change in viscosity or conductivity due to increase in polymer or metal salt concentration could then be easily identified.



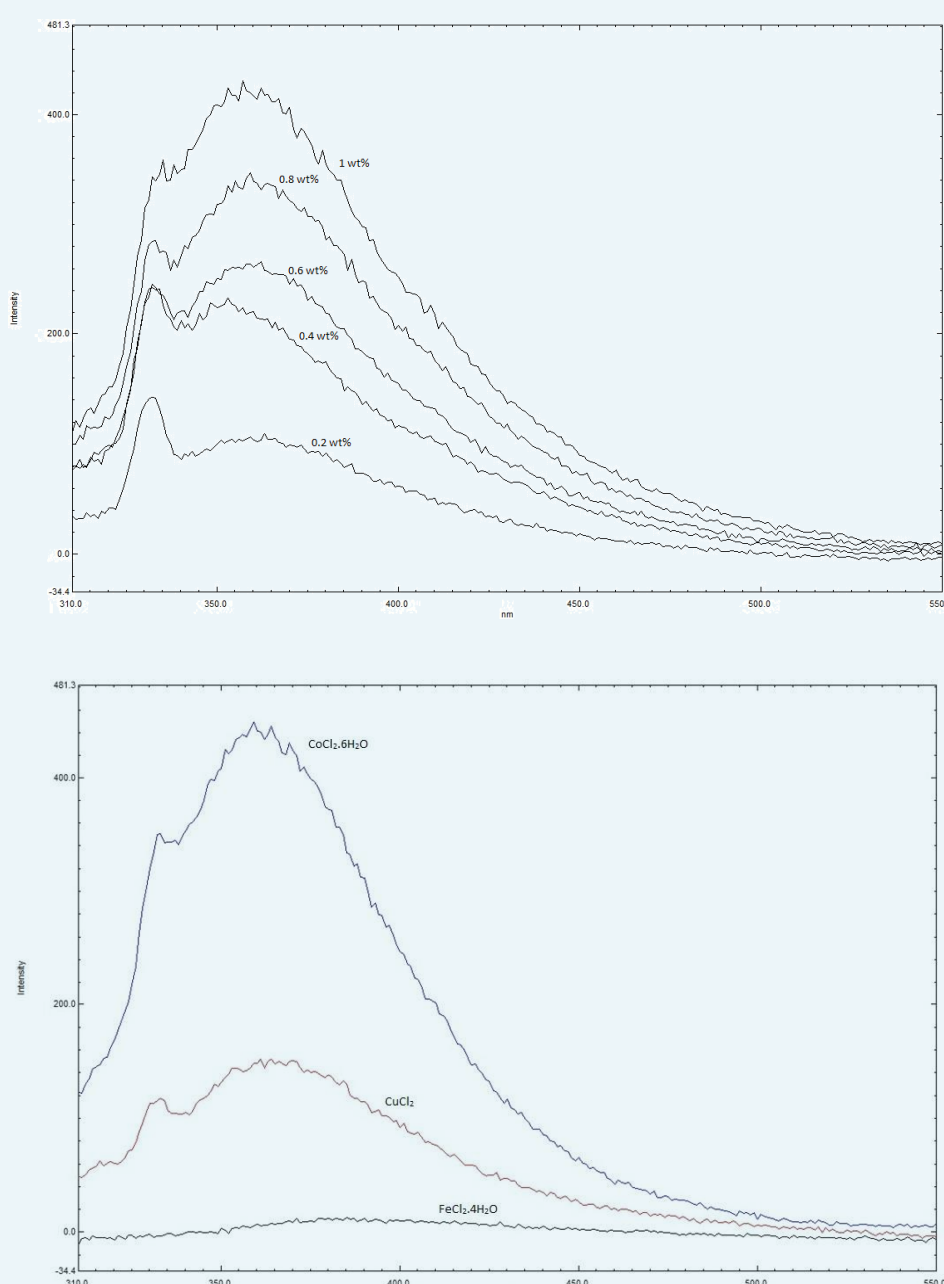
Comparison of the UV-Vis spectra of $0.01 \text{ g ml}^{-1} \text{ CuCl}_2$ in H_2O and that of when 0.02 g ml^{-1} PAA was added suggests that PAA bound to CuCl_2 as the peak at 255 nm decreased.



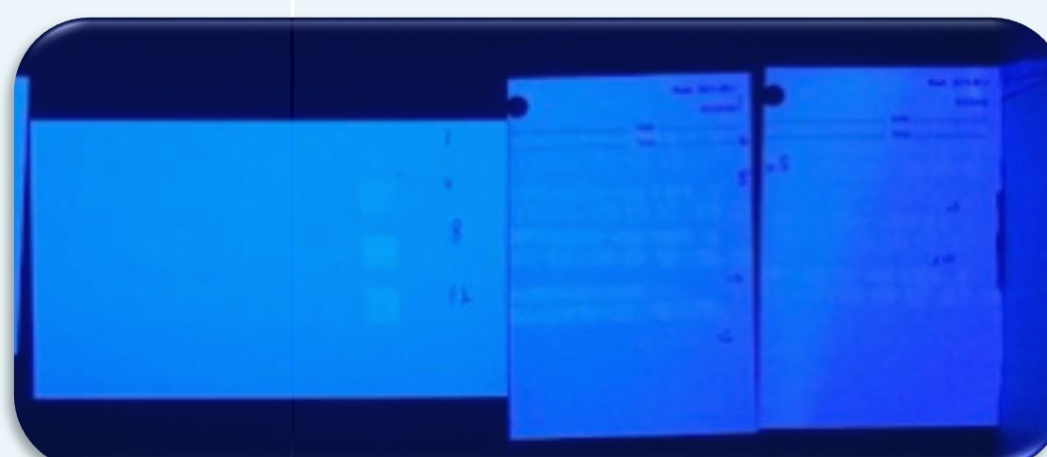
Comparison of PAA (red) and PAA-Cu complex (blue) from dialysis suggests the Cu^{2+} ions bind to PAA through the lone pair on the carbonyl group as this is the peak that changes with the introduction of the Cu salt.

From commercial polymer investigations, results suggest polymers that bind through the nitrogen atom form stronger complexes than those binding through the oxygen atom. The complexes bound through the nitrogen atom however are insoluble.

The fluorescence of PVP was investigated. It was shown that the fluorescence increased with PVP concentration and was quenched by varying degrees by different transition metal salts.



Printing a PVP solution in a CIJ printer showed fluorescence on sheen card with overprinting giving a greater intensity of fluorescence but the intensity appeared to decrease with time.



A sensing ink could be developed from this with the potential to decrease in fluorescence when it comes into contact with certain transition metals.

